*ON THE STUDY OF NATURAL HISTORY**

THE value of Natural History would be more fully appreciated if its higher aims were more perfectly understood. Too many fancied that the study of natural history consisted in mere collecting and naming, and looking at pretty objects. This was, however, mere scientific play; whereas the more thorough study was real work, of use not only as an intellectual training, but also as applied to the practical life of every day. They often heard the remark that the proper study of mankind was man, but to confine their study to him would be to take the first term of a great series, and neglect all the other terms—a proceeding which could lead only to an inaccurate and one-sided view of the order of the universe.

As an illustration of the connection of one class of facts with another he would briefly describe some of the results to which he had been recently led by applying physical methods to the study of the evolution of plants. He had studied the changes that had occurred in the colouring matters in the leaves and flowers during their development from a rudimentary to a perfect state, and the connection between them and the action of light, and had found that there was apparently a most remarkable correlation. When more and more developed under the influence of light, coloured compounds were formed which are more and more easily decomposed by the action of light and air when they were no longer parts of living plants, but dissolved out from them. There was thus apparently some condition in living plants which actually reversed these reactions.

He had also found that in the more rudimentary state of the leaves of the highest classes the colouring matters corresponded with those found in lower classes, and in the case of the petals of flowers their more rudimentary condition often corresponded with some other variety, which thus appeared as if due to a naturally arrested development of a particular kind. This principle would perhaps serve to explain the greater prevalence of flowers of particular colours in tropical or colder regions and at different elevations. Now, since the effect of the various rays of light was different, it became a question of much interest to decide whether an alteration in the character of the light of the sun would produce a somewhat different effect in the case of other classes of plants in which the fundamental colouring matter differed; for example, whether light, with a relatively greater amount of the blue rays, might not be relatively more favourable to the cryptogamia than to the flowering plants. So far this was a mere theoretical deduction; but, if proved to be true by experiment, it might, at all events, assist in explaining the difference in the character of the vegetation of our globe at an earlier epoch, when perhaps our sun was in a somewhat different physical state, and the light more similar to that of Sirius and other stars of the highest and bluer type.

The practical applications of natural history were of course most varied, but he would now merely refer to such as depended upon the equilibrium between different plants and animals. The successful cultivation of useful plants in a foreign country might depend upon very complicated conditions to be learned only by accurate study. The accidental introduction of some plants or animals might prove most injurious if there were no native check to their inordinate multiplication. This was perhaps why in some cases such importations were far more injurious than in their native country, and it became of great importance to learn what means could be taken to provide some adequate check.

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* From an address by Mr. H. C. Sorby at the annual *conversazione* of the Sheffield Field Naturalists' Club, January 5.

TRILOBITES

JOACHIM BARRAUDE has published a preliminary epitome (Prague and Paris, 1871, 8vo) of an intended supplement to his "Système Silurien du Centre de la Bohême."

He therein gives a list of the fossils as yet found in the Cambrian formation:—"PLANTÆ: Palæophycus, 1 species; Fucoides, 2; Archæorrhiza, 1; Halopoa, 2; Cordaites, 1; Eophyton, 2; Frœna, 1; Buthotrephis, 1; Scotolithus, 1; Oldhamia, 3; PETRIFICATA INCERTÆ SEDIS: Cruziana, 2; Lithodictyon, 1; ANIMALIA: *Vestigia*, vel Vermium, vel Crustaceorum, vel Molluscorum: Psammichnites, 4; *Spongia:* Astylospongia, 1; *Cœlenterata:* Protolyellia, 1; *Echinodermata:* Spatangopsis, 1; (doubtful Echinoderm?), Agelacrinus, 1; *Vermes:* Micropium, 1; Spirocolex, 2; Scolithus, 4; Monocraterion, 1; Diplocraterion (Arenicolites), 4; Histioderma, 1; *Mollusca:* Dictyonema, 1; Lingula, 2; Lingulella, 1; Discina, 1; Obolus, 1; Hyolithus, 1."

Whilst this formation has only yielded 28 animals, his next epoch, his "Silurische Primordial Fauna" supplies 366 species as follows:—

NUMBER OF GENERA.	CLASSES.	NUMBER OF SPECIES.												
		CENTRAL EUROPEAN ZONE.		EUROPEAN.		NORTH AMERICA.								DIFFERENT SPECIES.
		Bohemia.	Spain.	Scandinavia.	England.	Newfoundland.	Canada—Vermont.	New Brunswick.	New York.	Massachusetts.	Upper Mississippi.	Texas.	Georgia.	
28	Trilobita	27	9	77	61	9	9	18	6	1	37	8	1	252
2	Ostracoda	...	1	5	4	...	...	...	...	...	...	...	...	10
2	Other Crustacea	...	...	...	1	...	...	...	...	...	1	...	...	2
5	Vermes	...	...	...	4	...	...	...	...	...	1	...	...	5
2	Pteropoda	5	...	2	7	...	3	...	...	...	1	...	...	18
1	Heteropoda......	...	...	...	1	...	...	...	...	...	...	...	...	1
2	Gasteropoda ...	...	2	...	...	...	...	...	...	...	2	...	...	4
12	Brachiopoda ...	2	6	8	12	...	5	6	2	...	9	5	...	55
4	Bryozoa	1	...	4	1	...	...	...	...	...	1	...	...	7
6	Cystidea	5	1	...	1	...	...	1	...	...	...	...	...	8
2	Spongia	...	...	...	3	2	2	...	...	...	...	...	...	7
66	TOTAL	40	19	96	95	11	19	25	8	1	52	13	1	366

The author remarks on the discordance between the picture thus offered and that which should appear to give any positive confirmation to Darwinism. He then goes on to remark on some phenomena in the development of Trilobites.

According to the Darwinian theory, the development of the individual should bear relation to the past development of the species. Now Trilobites, as they develope, increase in number of their body segments, and therefore the earliest Trilobites ought to have few such segments. But those of the primordial fauna are generally characterised by the opposite condition, while the number is left in those of the succeeding fauna.

Again, on the Darwinian theory, there ought at first to be but few types, the number increasing later. But, in fact, out of seventy-five genera of Trilobites, no less than seventy-two appear in the first two Silurian faunas, and the three others at the beginning of the third fauna. Moreover, the perfection of organisation by no means gradually increases but is quite irregular.

Once more as regards orders, there is no approximation as we recede in time. The Trilobites, Phyllopoda, and Ostracoda, are as sharply differentiated at their very first appearance as they are later, and the Trilobites of the lowest beds are not less easy to divide into genera than those of a later period. *Bohemilla* might, perhaps, be

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considered as an intermediate form between *Agnostus* and *Paradoxides* (resembling the former in its segments, the latter in its head), but then its geological position is above, not below, those genera.

In the Primordial fauna no single Trilobite has been discovered which can be regarded as an intermediate connecting link between and two other genera.

Finally, no trace of a Tribolite has been found in the antecedent Cambrian formation, and yet from the number of these fossils found it is eminently likely that had they existed they would have left traces of their existence amongst the Cambrian fossils.

The author concludes that we have here a very important discord between Darwinism and facts.

NOTES

By the kindness of Dr. Draper, of New York, we are enabled to issue to our readers this week a copy, absolutely untouched, of a photograph of a part of the solar spectrum recently obtained by that gentleman by means of the reflection grating suggested by himself, and made by Mr. Rutherfurd. There is no doubt that in all such physical inquiries as those in which Dr. Draper is interested all observations will in time be permanently recorded by means of photography, and to this end the labours of Drs. Draper, father and son, will have contributed in no mean degree.

We learn from the *Athenæum* that the Gold Medal of the Royal Astronomical Society has been awarded by the Council of the Society to Prof. Simon Newcomb, of the United States, for his tables of Neptune and Uranus, and other mathematical works.

The French Academy of Sciences, at their meeting on Monday last, elected Dr. Huggins, F.R.S., and Prof. Simon Newcomb, to fill two vacancies among the correspondents in the Astronomical Section.

We regret to announce the premature death of two eminent French *savants*, Dr. Legros, who has been poisoned in the course of histological researches, and M. Fernand Papillon, well known for his physiological investigations.

Sir Samuel Baker has been appointed Rede Lecturer in the University of Cambridge for the ensuing year. Sir Samuel, upon whom the University conferred the honorary degree of Master of Arts in 1866, will deliver the lecture in the Easter Term.

Sir Samuel Baker was entertained on Monday at a banquet given by the Mayor and Town Council of Brighton, at the Royal Pavilion. In a long and interesting speech Sir Samuel Baker referred to the progress of African discovery, the resources of Africa and the future of the natives, which he does not think hopeful, and of what he did for the suppression of the slave-trade.

There has been a good deal said recently as to the fate of the Memorial to Government in favour of an Arctic Expedition; but we believe the matter stands exactly as it did when our article appeared on Dec. 11 last (Nature, vol. ix. p. 97). The uncalled-for and aggravating delay of Mr. Gladstone in answering the Memorial is only what might be expected.

From the 1st inst. there will be published daily at Copenhagen a "Bulletin Météorologique du Nord," containing the daily reports from the Danish, Norwegian, and Swedish stations. This makes the fourth such publication in Europe, the others being published in France, Russia, and in this country. In almost all other countries the reports appear at least in the newspapers.

Ornithologists will be glad to hear of the safe arrival lately in the Gardens of the Zoological Society, of a pair of very interesting new species of White Stork (*Ciconia boyciana*) from Japan, described by Mr. R. Swinhoe nearly a year ago. This new form presents points of particular interest, as in general appearance it resembles both the common European Stork (*C. alba*) as well as the Maguari Stork (*C. maguari*) of South America, and so tends to favour the impression derived from other facts—such as the geographical distribution of the *Tapiridæ*, of the *Cinclidæ*, and perhaps of the *Cervulidæ*, if, as shown by Sir Victor Brooke, *Cervus pudu* is related to them in important osteological peculiarities—that it is in that direction, and not across the Atlantic Ocean that the European continent was last in communication with the New World.

We direct the attention of our readers to the account, given in another page, of an extraordinary gigantic new form of Miocene mammals, the *Brontotheridæ*, from Colorado, discovered by Prof. Marsh of Yale College.

We are glad to observe that Mr. Dresser's excellent work on "The Birds of Europe" continues to appear with marvellous regularity, considering the amount of work involved. A double number, comprising Parts 23 and 24, is just issued, completing the second volume in fourteen months; and the author states that he has such a large amount of manuscript ready in advance, that he can with confidence promise equal punctuality with the next volume. The work continues to maintain its high character both in letter-press and illustrations. The plates representing the Spoonbill and the Snowy Owl, in the parts just issued, are charming pictures as well as accurate ornithological portraits.

A telegram from Philadelphia announces that the Siamese Twins died on Saturday at their home in North Carolina, aged 63. Eng lived two hours longer than Chang.

We learn that M. J. C. Houzeau has been investigating the directions of the major axes of cometary orbits. He has examined 233 orbits from Mädler's catalogue, but for the purposes of his investigation he has eliminated those comets of short period, having their aphelia inside the orbit of Neptune, numbering 15, and also the seven probable appearances of Halley's comet and three others whose elements are uncertain, and so reduces the number 233 to 208; he, however, adds Comet I., 1819, making 209 comets whose orbits he discusses. He finds that there is a decided tendency in the major axes of those orbits to place themselves parallel to the double heliocentric meridian 102° 20′ and 282° 20′, being only 28° from long. 254° 5′, in which the point that the solar system is approaching is situate. The major axes do not, however, show a tendency to aggregate near lat. + 57° 26′, in which the before-mentioned point lies; but he observes that it is probable that a large number of southern comets have passed unseen, and that there may be inaccuracies in the elements of the orbits.

We have received several documents relating to the School of Mines, Ballaarat, which was established in 1870, its primary object being to impart instruction in the various branches of science relating to mining, the theory and practice of mining, mine management, mining surveying, and mining engineering. It grants certificates to all classes of men connected with mining, from mining-engineers and assayers to engine-drivers, all candidates being subjected to a good testing examination. The attendance at the School has increased every quarter since it was started, the number of students in the third term of 1873 having been 59. The benefit likely to accrue to a mining country such as Victoria from an efficient school of this kind is incalculable, and

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